COURSE DESCRIPTION CARD - SYLLABUS

Course name

Introduction to Combustion Process

Course

Field of study

Aerospace Engineering

Year/Semester

1/I

Area of study (specialization)

Profile of study

general academic

Level of study

Second-cycle studies

Course offered in

polish

Form of study

full-time

Requirements

compulsory

Number of hours

Lecture

15

Laboratory classes

Other (e.g. online)

Tutorials

Projects/seminars

Number of credit points

1

Lecturers

Responsible for the course/lecturer:

dr hab. inż. Rafał Ślefarski

email: rafa.slefarski@put.poznan.pl

tel. 616652218

Faculty of Transpot Engineering

ul. Piotrowo 3 60-965 Poznań

Responsible for the course/lecturer:

Prerequisites

Student has basic knowledge in the field of chemistry, fluid mechanics, combustion processes, heat transfer and energy conversion for fuels used in aviation and aeronautics fields. have skills required to solve engineering problems with scientifically valid methodologies. Can effectively acquire the information from various sources including datasheets, literature and Internet.

Course objective

To acquaint students with knowledge about combustion process of fuels used in powering system of airplane and space shuttle.

Course-related learning outcomes

Knowledge

Student has extensive knowledge, necessary for understanding of profile subjects and specialist knowledge about construction, methods of construction, manufacturing, exploitation, air traffic management, security systems, impact on the economy, society and environment of the aviation and cosmonautics for selected specialties: Aeronautical Engineering

Student has ordered, supplemented with theoretical issues general knowledge covering key issues in the field of the impact of aviation on the environment, the emission of toxic compounds of aviation propulsion, acoustic emission of flying objects.

Student has detailed knowledge in the field of chemistry, combustion processes, stoichiometry, heat exchange processes, heat conversion into a thrust for fuels used in aviation and aeronautics.

Skills

Student has the ability to self-study using modern teaching tools, such as remote lectures, websites and databases, didactic programs, e-books.

Student can obtain information from literature, the Internet, databases and other sources. Can integrate the information obtained and interpret conclusions and create and justify opinions.

Student can draw a technical scheme of a complex machine element in accordance with the principles of technical drawing, can create a circuit diagram, select elements and perform basic calculations of the electrical and electronic system of sets of aircraft or space equipment.

Social competences

Student understands the need to learn throughout life; he can inspire and organize the learning process of other people.

Student is ready to critically evaluate the knowledge and content received, recognize the importance of knowledge in solving cognitive and practical problems and consult experts in the case of difficulties in solving the problem.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: Knowledge acquired during the lecture is verified during the final test carried. Each test consists of 20 closed questions. Passing threshold: 50% of points. Final issues on the basis of which questions are prepared will be sent to students by e-mail using the university e-mail system.

Programme content

Lecture: Combustion process, oxidizers, reaction mechanism of fuels used in aviation and space engineering, stoichiometry of combustion process, premixed flames, diffusion flames, axisymmetric flames, swirl flames, heat of reaction, adiabatic flame temperature, formation mechanism of toxic compounds during combustion process, flame stability methods, flashback phenomena, blowout phenomena.

Teaching methods

Lecture: multimedia presentation, illustrated with examples on the board

Bibliography

Basic

Dobski, T.: Combustion Gases in Modern Technologies, 2scd Ed., Wydawnictwo Politechniki Poznańskiej,

Jarosiński J.: Techniki czystego spalania, WNT,

Stefan Wisniewski, Termodynamika Techniczna

Wilk R.K.: Low-emission Combustion, Wydawnictwo Politechniki Śląskiej, Gliwice 2002

Additional

Thierry Poinsot: Theoretical and numerical combustion

Warnatz J., Maas U., Dibble R.W.: Combustion, Sprinter-Verlag, Berlin–Heidelberg 1999

Breakdown of average student's workload

	Hours	ECTS
Total workload	25	1,0
Classes requiring direct contact with the teacher	17	0,6
Student's own work (literature studies, preparation for passing and exam, participation in consultations) [1]	8	0,4

[1] delete or add other activities as appropriate